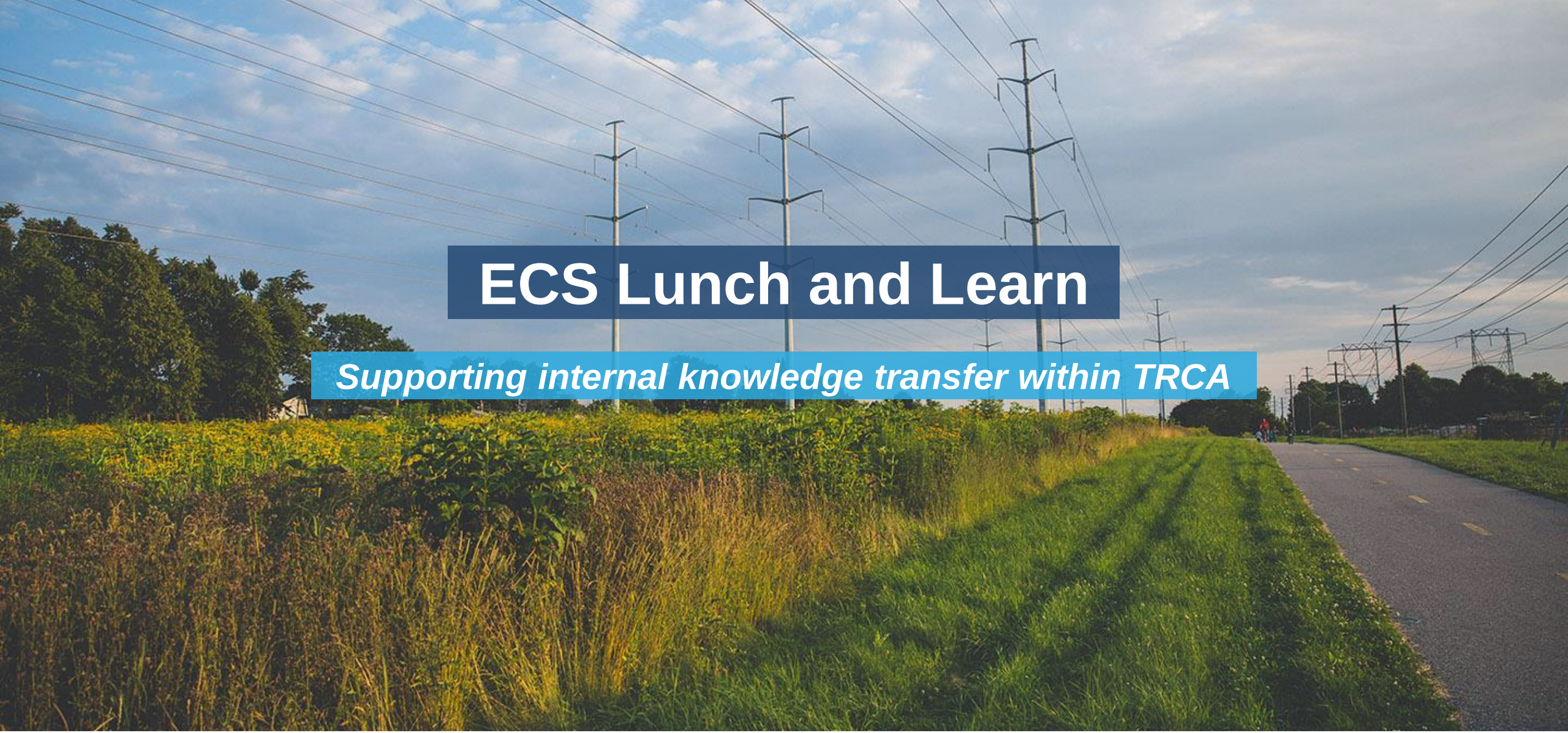


ECS Lunch and Learn

Supporting internal knowledge transfer within TRCA

February 10, 2021

Toronto and Region Conservation Authority

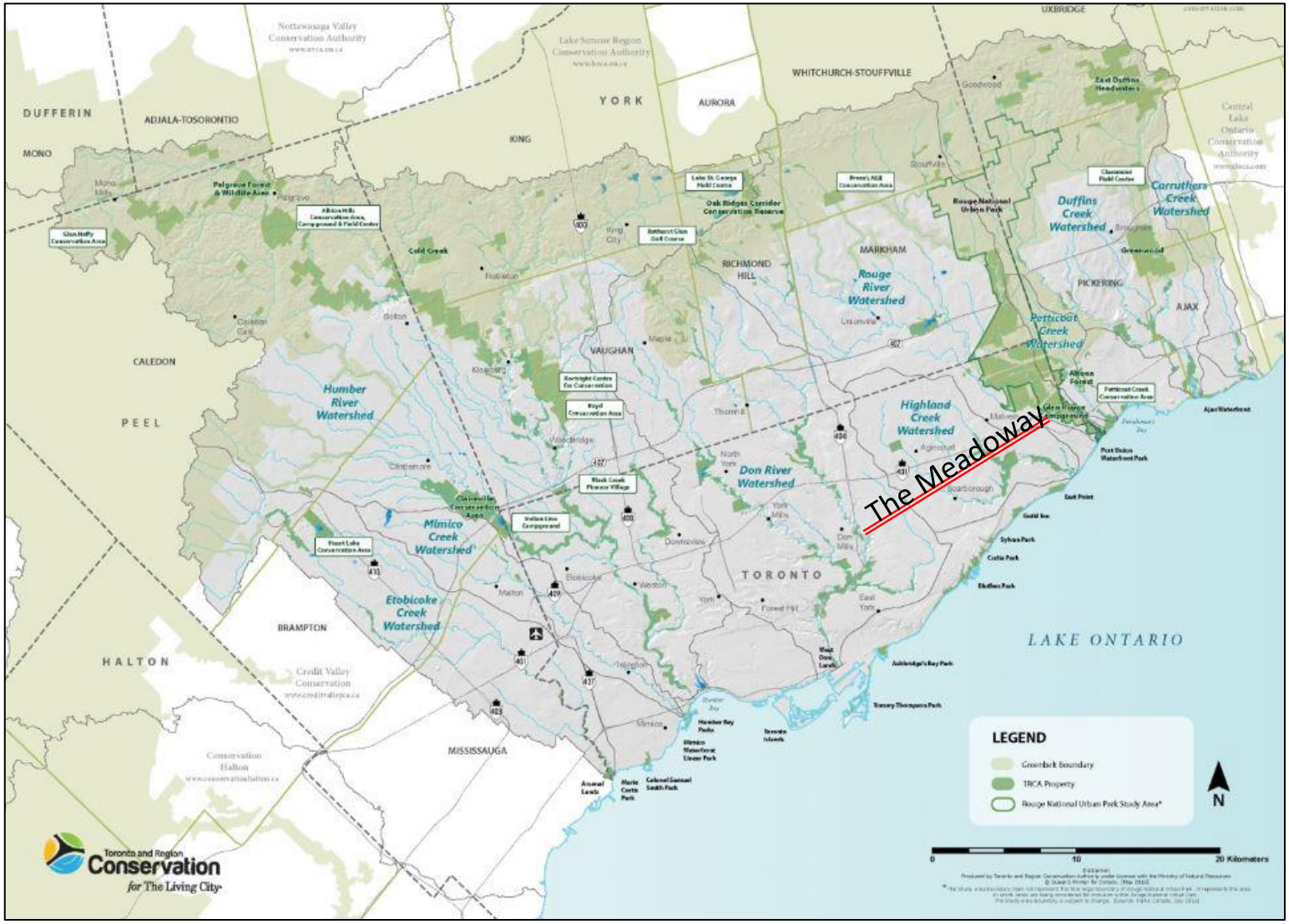
The Meadoway

Research Overview

The Meadoway
COMMUNITY POWERED GREEN SPACES

Presented by: TRCA

A project of: Toronto and Region Conservation Authority



The Meadoway
COMMUNITY POWERED GREEN SPACES

Project Objective

To revitalize a 200+ hectares underutilized hydro corridor across Scarborough to increase biodiversity, connect local communities to nature, and develop a successful pilot program that can be replicated across the country.

CONNECTIONS

NATURAL ENVIRONMENT & EDUCATION

TRANSPORTATION

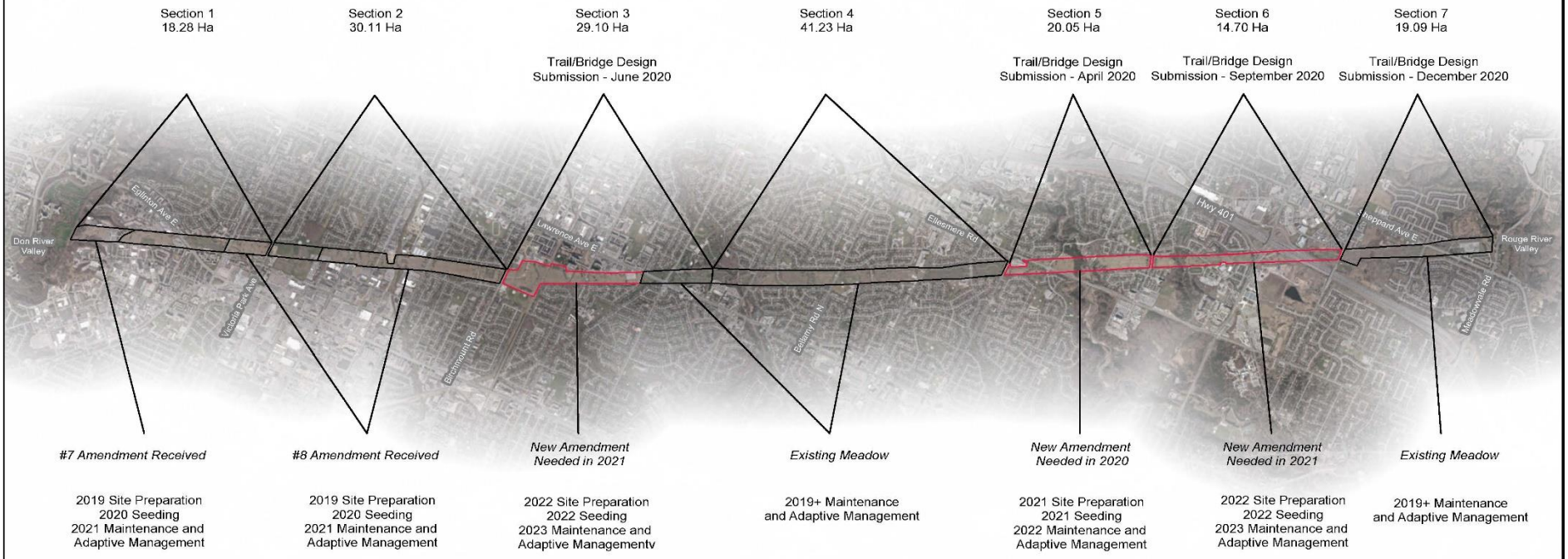
RECREATION

COMMUNITY & PUBLIC REALM

BLUEPRINT FOR REVITALIZATION

The Meadoway
COMMUNITY POWERED GREEN SPACES

The Meadoway



#7 Amendment Received

2019 Site Preparation
2020 Seeding
2021 Maintenance and
Adaptive Management

#8 Amendment Received

2019 Site Preparation
2020 Seeding
2021 Maintenance and
Adaptive Management

New Amendment Needed in 2021

2022 Site Preparation
2022 Seeding
2023 Maintenance and
Adaptive Managementv

Existing Meadow

2019+ Maintenance
and Adaptive Management

New Amendment Needed in 2020

2021 Site Preparation
2021 Seeding
2022 Maintenance and
Adaptive Management

New Amendment Needed in 2021

2022 Site Preparation
2022 Seeding
2023 Maintenance and
Adaptive Management

Existing Meadow

2019+ Maintenance
and Adaptive Management

Lease Status Current City of Toronto Lease | Amendment Requirements In Future Years

Date: 11/5/2019
Created by: Restoration Projects
Orthophoto: First Base Solutions, 2018

0 1 2 4
Kilometers

Toronto and Region Conservation Authority

Disclaimer: The data used to create this map was compiled from a variety of sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA Restoration and Infrastructure Division. (416) 661-6600.

The Meadoway
COMMUNITY POWERED GREEN SPACES

The Meadoway Research – 5 Key Areas of Focus

2020

1) Biodiversity
   - UoT Bee Inventory –Sisley Irwin
   - Species Gantt Chart
   - Terrestrial Monitoring Plots/Transects (Birds, Butterfly, Flora)
2) Climate Change
   - Soil organic matter
   - Plant biomass
3) Water Management
   - UoT Dr. Jennifer Drake and Ke Qin
     - Infiltration Tests
     - Soil Samples
     - Root Density Sampling
     - Literature Reviews
4) Meadow Restoration Techniques
   - Seeding Mix Trials
   - Seed Packing/Preparation Trials
5) Invasive Species Management
   - Glyphosate Degradation Curve
   - Mechanical Methods
   - Herbicide Alternatives
   - Milkweed Barrier for DSV

2021

1) Continue 2020 Research Initiatives
2) Key Performance Indicators
   - Creating qualitative and quantitative measurable matrix

   Examples:
   - Biodiversity Index
   - Terrestrial Natural Heritage System Targets
   - Surface temperature changes
   - Resiliency for Climate Change
   - Adding Natural Cover (ha)
   - Improvements to Quality (ha)




University of Toronto Research

Bee Inventory

- MITACS student Sisley Irwin looked at pollinator and flower interactions
- 11 plots were surveyed, representing pre-restoration sites, newly planted sites, and sites 1-3 years post restoration
- Using a special bee vacuum, species were collected and released
- 878 plant-pollinator interactions were recorded in Sections 1-7
- Nectar samples were taken from several plant species to measure volume and sugar content
- Data analysis winter 2021

Biodiversity Species Gantt

Plants		May				June				July				
Species Name	Common Name	1	2	3	4	1	2	3	4	1	2	3	4	5
Fragaria virginiana	Wild Strawberry	F	F	F	F	F	F	S	S					
Antennaria plantaginifolia/neglecta	Field Pussytoes			F	F	S	S							
Alliaria petiolata	Garlic Mustard	F	F	F	F	F	F	S	S	S				
Vincetoxicum rossicum	DSV					F	F	F	F/S	F/S	F/S	F/S	F/S	
Cypripedium parviflorum	Yellow Lady's Slipper					F								
Aquilegia canadensis	Wild Columbine					F	F	F		S				
Zizia aurea	Golden Alexander					F	F							
Lupinus perennis	Wild Lupine					F	F			S				
Penstemon hirsutus	Hairy Beardtongue					F	F	F						
Geranium maculatum	Wild Geranium					F	F							
Anemone canadensis	Canada Anemone					F	F	F				S		
Sisyrinchium montanum	Blue-Eyed Grass					F	F	F		S	S	S		
Trifolium pratense	Red Clover				F	F	F	F	F	F	F			
Trifolium repens	White Clover					F	F	F	F	F	F			
Lotus corniculatus	Bird's-foot Trefoil					F	F	F	F	F	F	F		
Hieracium caespitosum	Yellow Hawkweed						F	F						
Asclepias syriaca	Common Milkweed								F	F	F	F/S	F/S	F/S

- Birds, bees, butterflies and mammals were also monitored with the Gantt

The Meadoway
COMMUNITY POWERED GREEN SPACES

www.themeadoway.ca

University of Toronto Research

Dr. Jennifer Drake and Ke Qin research on soils and hydrology:

- Infiltration rates (54 samples done)
- Soil Characteristics (282 soil samples collected)
- Soil organic matter
- Moisture holding
- Moisture release curve
- Nutrient holding capacity / capture
- Groundwater recharge and discharge rates
- DNA testing for soil microorganisms

Seasonal Seeding Plots

The Meadoway
Section 1.2
Seasonal Seeding (grass mix)
and Cover Crop Trial
2019-2020

Treatment
- NO Spray Areas
- Winter
- Spring
- Fall
- Oats
- Millet

Habitat type
- Buffer Mow
- Meadow-In Prep
- Shrub Node-Proposed

Notes:
Millet cover crop at 50% (11kg/ha) will be used for all meadow seeded areas done by seed drill on the east half of section 1.2

The Meadoway
Section 1.2
Seasonal Seeding (Butterfly mix)
2019-2020

Treatment
- NO Spray Areas
- Winter
- Spring

Habitat type
- Buffer Mow
- Meadow-In Prep
- Shrub Node-Proposed

Notes:
Seedmix is Butterfly mix in the treatment plots

Oat cover crop 50% (32kg/ha) will be used for all meadow seeded areas done by seed drill on the west half of section 1.2

The Meadoway
COMMUNITY POWERED GREEN SPACES

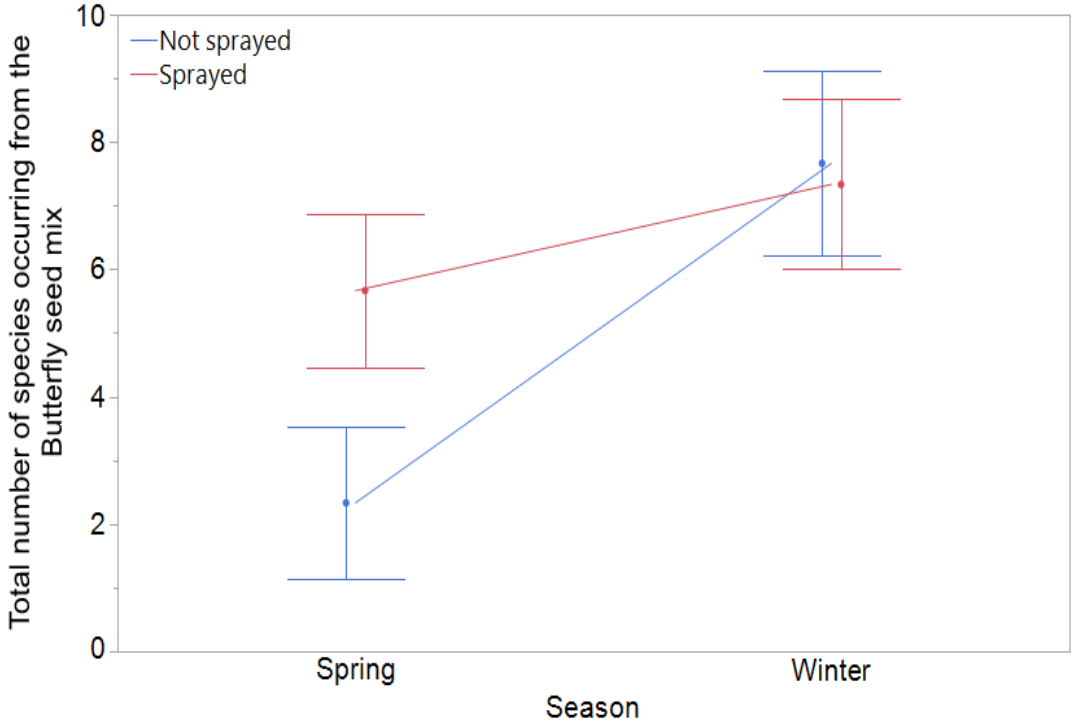
www.themeadoway.ca

Seasonal Seeding Plots - Results

33 1x1m plots

Butterfly test plots

- ↑ success winter
- Spraying effective if spring
- No diff b/w hand or seed drill



The Meadoway
COMMUNITY POWERED GREEN SPACES

www.themeadoway.ca

Seasonal Seeding Plots - Results

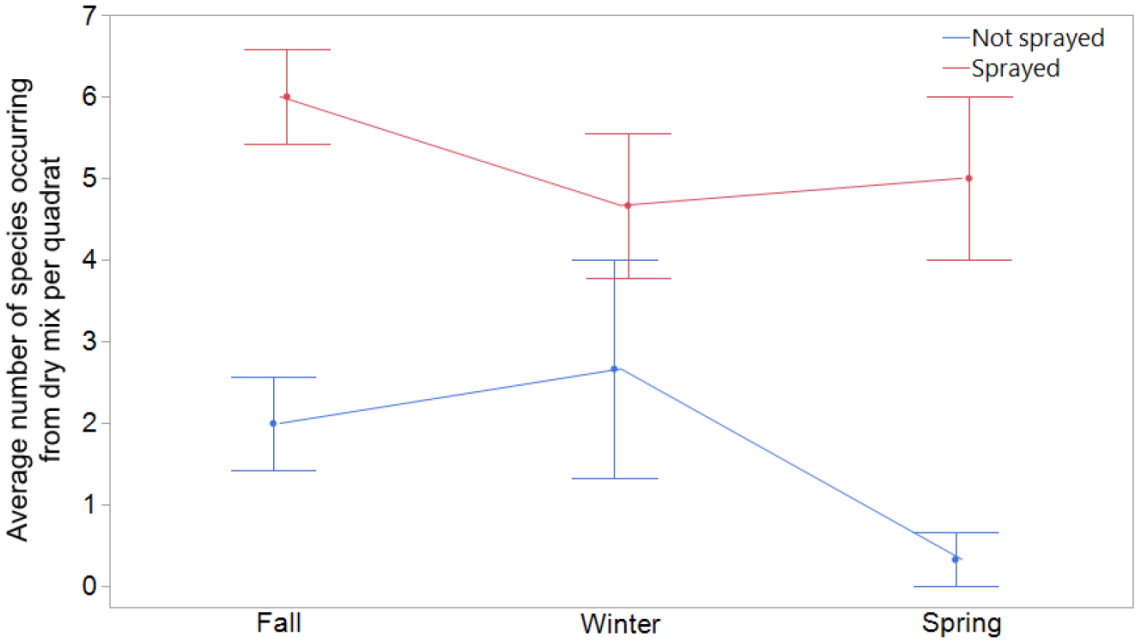
33 1x1m plots

Butterfly test plots

- ↑ success winter
- Spraying effective if spring
- No diff b/w hand or seed drill

Dry mix test plots

- Spraying ↑ success but was most effective in fall and spring compared to winter
- No effect of season on success

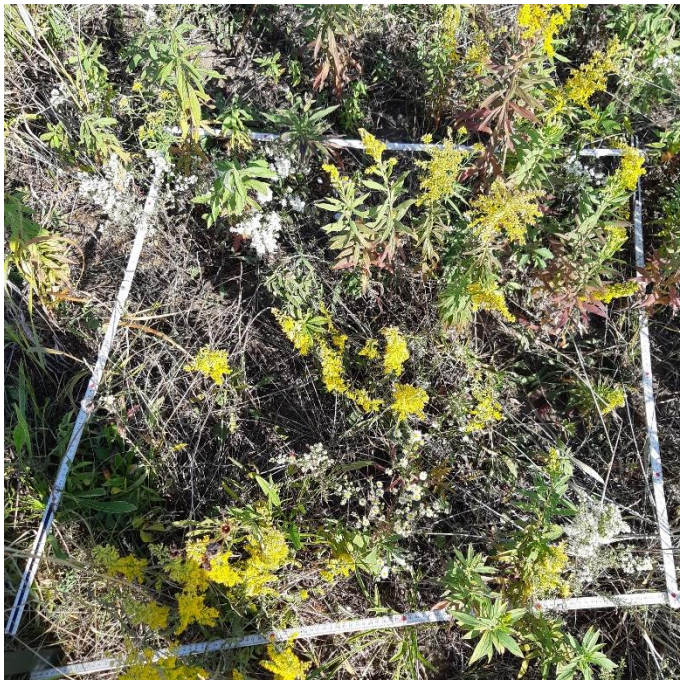


The Meadoway
COMMUNITY POWERED GREEN SPACES

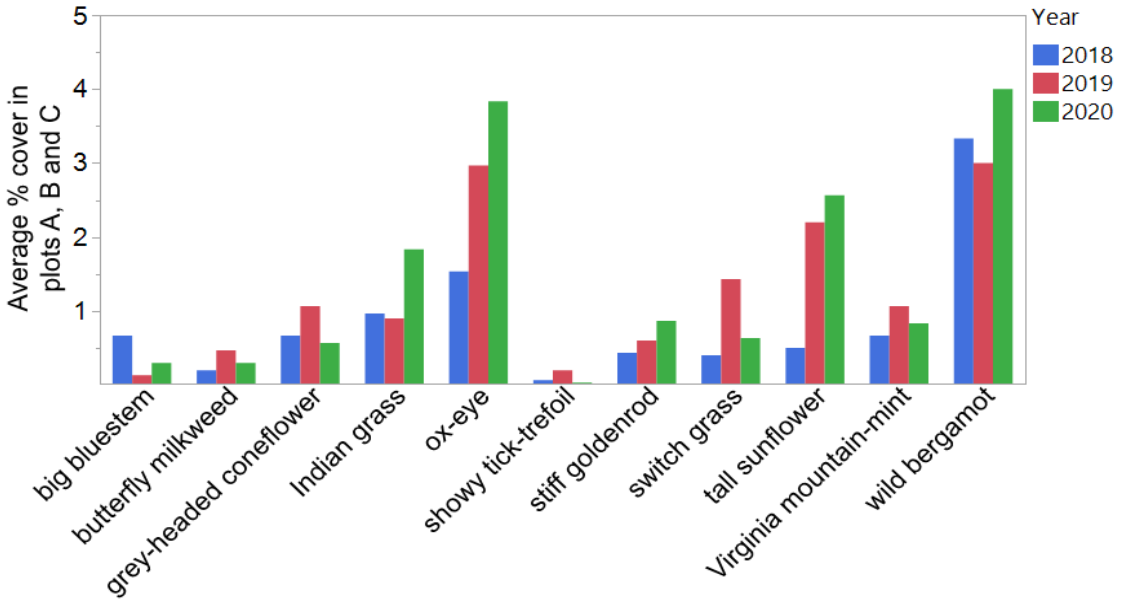
www.themeadoway.ca

TRCA Terrestrial Monitoring

- 33 Monitoring plots
- 8 Bird stations and 10 Butterfly transects



TRCA Terrestrial Monitoring - Results



- Grasses taking off in some areas
- Increasing cover of seeded species
- New species from seed mix discovered
- Nectaring opportunities for butterflies
- Foraging opportunities for aerial insectivorous birds

The Meadoway
COMMUNITY POWERED GREEN SPACES

www.themeadoway.ca

Seed Packing/Preparation Trials

Final prep - Harrow/Packer/Combination

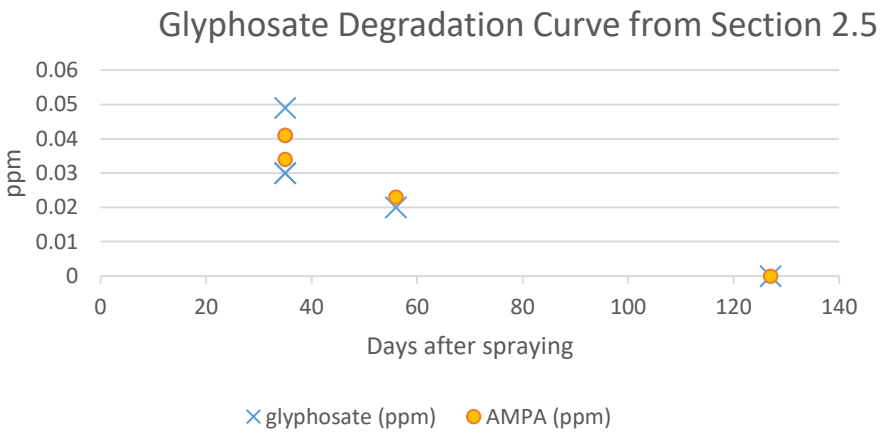
- 2019 found harrows after broadcast seeding resulted in best germination of cover crop
- However, this results in soft soil and lots of air spaces
- Tested using a packer compared to a harrow or combination for final preparation before seed drilling:

Seed Packing/Preparation Trials

Moving Forward: Look into equipment that can do both faster

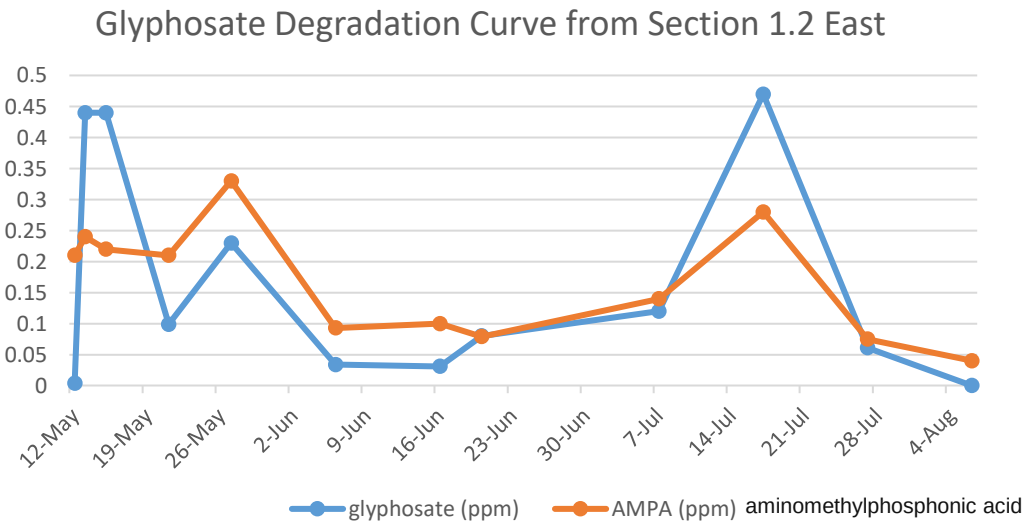
The Meadoway
COMMUNITY POWERED GREEN SPACES

Invasive Management – Glyphosate Degradation



- Community garden resident concern
- No degradation curves found in the literature

- More detailed testing – inconclusive due to spike in July
- Repeating this year with more samples



The Meadoway
COMMUNITY POWERED GREEN SPACES

www.themeadoway.ca

Invasive Management – Mechanical Methods

Repeated tilling for site preparation (mow, till, cover crop)

- 25ha reduction in 2 X blanket applications of Glyphosate
- Section 5 planned for NO blanket spray

Targeted thistle trimming

- 35ha reduction in spot spraying
- Most managed invasive
- Looking for more research on thistle management

Digging/pulling of Knapweed

- 2ha reduction in spot spraying

The Meadoway
COMMUNITY POWERED GREEN SPACES

Invasive Management

Reducing the use of Glyphosate - Alternative herbicide treatments

- DSV removal by comparing 4 alternative chemicals with glyphosate
- Canada Thistle treatment with Finalsan
- Knapweed with 4 methods including physical and chemical
- Blanket spray alternatives
- Steam applications
- Milkweed Barriers


DSV


Canada Thistle

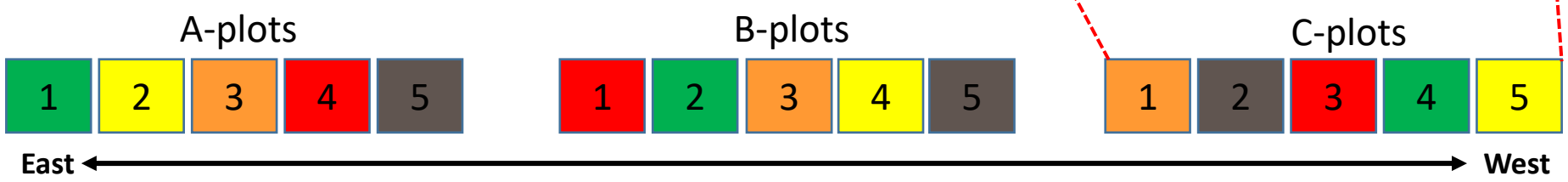

Spotted Knapweed

The Meadoway
COMMUNITY POWERED GREEN SPACES

Invasive Management

Alternative Herbicides on DSV:

- Red – Glyphosate (5% solution)
- Green – Weed B Gone (Chelated Iron)
- Yellow – Mungers Agricultural 20% Vinegar
- Orange – Finalsan (Ammonium soap of fatty acid
- Brown – Borax solution (1 oz Borax/L Water)



The Meadoway
COMMUNITY POWERED GREEN SPACES

Invasive Management

Glyphosate

Weed B Gone

Vinegar

Finalsan

Results 2 months post application

Borax

The Meadoway
COMMUNITY POWERED GREEN SPACES

www.themeadoway.ca

Invasive Management

Results: plot B3 - Finalsan – Ammonium Soap of Fatty Acids

The Meadoway
COMMUNITY POWERED GREEN SPACES

Invasive Management

Finalsan effects on Canada Thistle:

- Limited success – stopped flowering
- More research needed

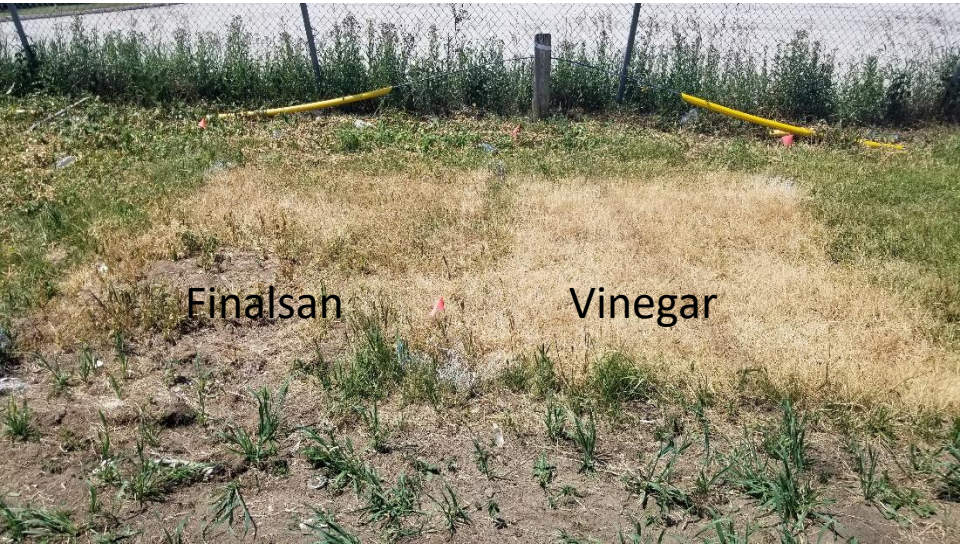
Knapweed trial:

- Pulling – Reasonably effective, reduced flowering
- Cutting – Grows back within a month and will continue to flower
- Glyphosate – Effective – but kills everything around it
- Finalsan - Single application had limited effect on stopping flowering

Invasive Management

Alternative Blanket spray trial - Finalsan vs Agricultural Vinegar to kill all turf and weeds before tilling

- Agricultural Vinegar is more effective at killing turf
- Both grow back in short period of time
- Multiple tilling passes appears as effective without pre-spray.



One Week

Two Months later

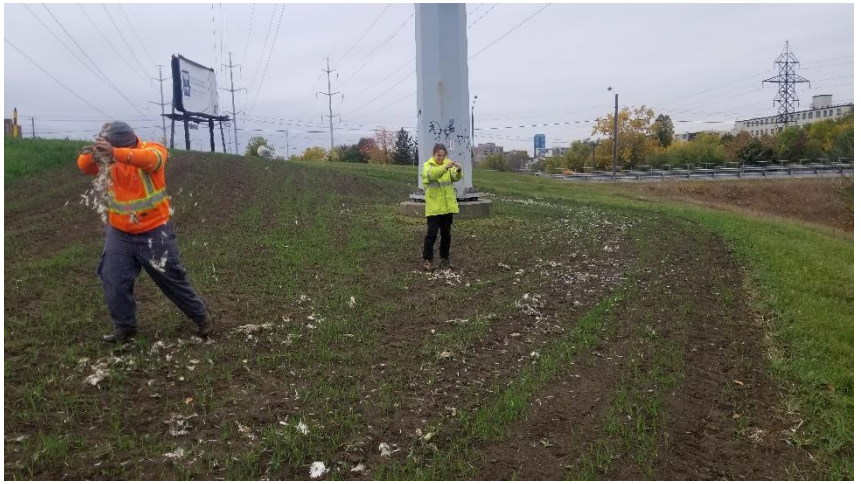
Invasive Management

Hot Steam Treatment:

- Needs multiple applications

Milkweed as a barrier:

- Research showed milkweed may reduce the growth of DSV



The Meadoway
COMMUNITY POWERED GREEN SPACES

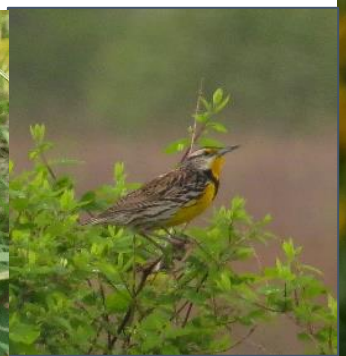
Future Research Planning

2021

1) Continue 2020 Research Initiatives
2) Key Performance Indicators-Group Discussion
    - Creating qualitative and quantitative measurable matrix

Examples:

- Biodiversity Index
- Terrestrial Natural Heritage System Targets
- Surface temperature changes
- Resiliency for Climate Change
- Adding Natural Cover (ha)
- Improvements to Quality (ha)



Thank You

Looking to find out more information? Feel free to reach out.

Lyndsay Cartwright
Data Analyst, Ecosystem and Climate Science
lyndsay.cartwright@trca.ca

Chris Cormack
Site Supervisor, Integrated Restoration
chris.cormack@trca.ca

Paul Morris
Project Manager, Integrated Restoration
Paul.morris@trca.ca

Katie Turnbull
Senior Project Manager, Integrated Restoration
Katie.Turnbull@trca.ca

The Meadoway
COMMUNITY POWERED GREEN SPACES

Upcoming ECS Lunch and Learns!

Wednesday, March 24
11:00am-12:00pm

Natural Heritage System (NHS) Update

By Namrata Shrestha

Wednesday, April 14
11:00am-12:00pm

Thermal Imaging for Restoration and Conservation

By Jonas Hamberg

Past Recordings

Watersheds and Ecosystems Reporting
Draft Web Application

Laura Del Giudice, Senior Manager, Watershed Planning & Reporting
Kristina Dokoska, Project Coordinator, Ontario Climate Consortium

September 21, 2020

Introduction to the LID Treatment Train Tool

Presented by – Steve Auger, Sahlla Abbasi and Yuestas David

STEP Water is a partnership between:

November 5, 2020

TRCA's Recent Floodplain Mapping Updates

Wilfred Ho*, Christina Bright*, Mike Todd**

* Flood Risk Management, Development & Engineering Services
** Information Technology & Records Management

November 10, 2020

Working with Indigenous Communities

Lunch and Learn

November 17, 2020

Green Infrastructure in Asset Management Planning

Presented by:
Michelle Sawka, Senior Research Scientist
Tracy Timmins, Research Analyst

Ecosystem and Climate Science

December 8, 2020

Explore TRCA's Biodiversity

How to get the most from our enormous natural heritage data set.

Presented by: Gavin Miller, Flora Biologist, Paul Prior, Fauna Biologist, and Parth Sheth, GIS Technician.

December 17, 2020

Evaluating the effectiveness of fish habitat restoration across the Toronto waterfront

Kaylin Barnes[1], Lyndsay Cartwright[1], Rick Portiss[1], Jon Midwood[2], Christine Boston[2], Monica Granados[3], Thomas Sciscione[1], Colleen Gibson[1], Olusola Obembe[1]

ECS Lunch and Learn
January 14, 2021

[1] Toronto and Region Conservation Authority
[2] Fisheries and Oceans Canada
[3] PREreview.org

Erosion Risk Management Program

Lunch and Learn Presentation

Presented by: Matt Johnston, Associate Director
Ashour Rehana, Manager
David Gingerich, Analyst

January 27, 2021

Thank you

For questions about the ECS Lunch and Learn Series, please contact:

Sharon Lam
sharon.lam@trca.ca

Toronto and Region Conservation Authority